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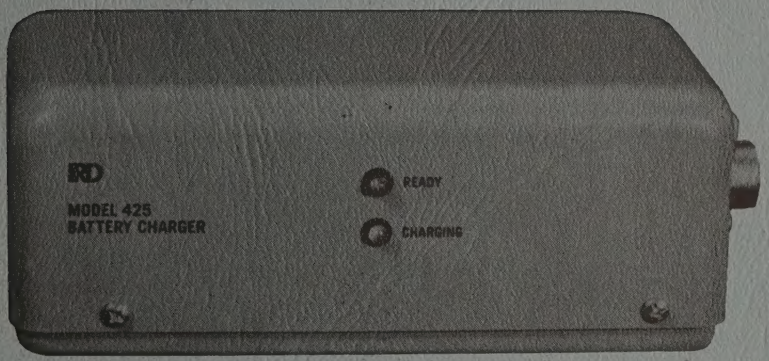

OPERATION INSTRUCTION MANUAL FOR MODEL 425 BATTERY CHARGER

IRD MECHANALYSIS
OPERATION AND SERVICE
INSTRUCTION MANUAL
FOR
BATTERY CHARGER
MODEL 425

IRD Mechanalysis, Inc.
Subsidiary of H. H. Robertson Company
6150 Huntley Road
Columbus, Ohio 43229
614-885-5376
Telex 24-5318

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I INTRODUCTION

1.1 PURPOSE AND SCOPE OF MANUAL

This Instruction Manual provides complete operation and service information for the IRD Mechanalysis, Model 425 Battery Charger. The manual describes: the instrument and its specifications, the setup required for use, instrument operation, and complete service information.

1.2 PURPOSE AND CAPABILITY OF MODEL 425

The Model 425 Battery Charger is used to recharge the internal and spare battery packs of the Model 820/820M Vibration/Spike Energy Analyzer, or to recharge spare battery packs for the Model 840/840M Vibration Spectrum Analyzer and the Model 1082 XY Plotter. In addition, the battery charger can also be used to power the Model 820/820M Analyzer for continuous AC operation.

II DESCRIPTION

2.1 GENERAL

The Model 425 Battery Charger and accessories consist of the Model 425 unit, the AC Power Input Cable, and the Instruction Manual. Optional accessories include the Charger Output Cable and Cable Adapter for the Model 820/820M Spare Battery Pack.

This chapter contains descriptions of the Model 425 Battery Charger controls, indicators, cable connectors, power fuses, and the standard accessories. The physical locations of Model 425 components discussed in this chapter are illustrated in Figure 1, which follows on Page 2.

2.2 DESCRIPTION

2.2.1 INDICATOR LIGHTS

Charging Light

The amber CHARGING LIGHT (LED) is lit during the charging process, or until the battery pack reaches 90 percent of the full charge capacity. During this time, the Battery Charger supplies a high level of charging current. In addition, the CHARGING LIGHT is also lit when the Battery Charger output is connected to the Model 820/820M Analyzer to power this instrument for continuous AC operation.

Ready Light

The green READY LIGHT (LED) turns on when the CHARGING LIGHT extinguishes, indicating that the battery pack is sufficiently recharged for use (charged to 90 percent of its full capacity). The Battery Charger then supplies a trickle charge current to the spare battery pack (or the Model 820/820M internal battery pack) to maintain a full charge. The READY LIGHT remains lit if the Battery Charger is connected to the AC power line and the charger outputs are not connected to a battery pack or instrument.

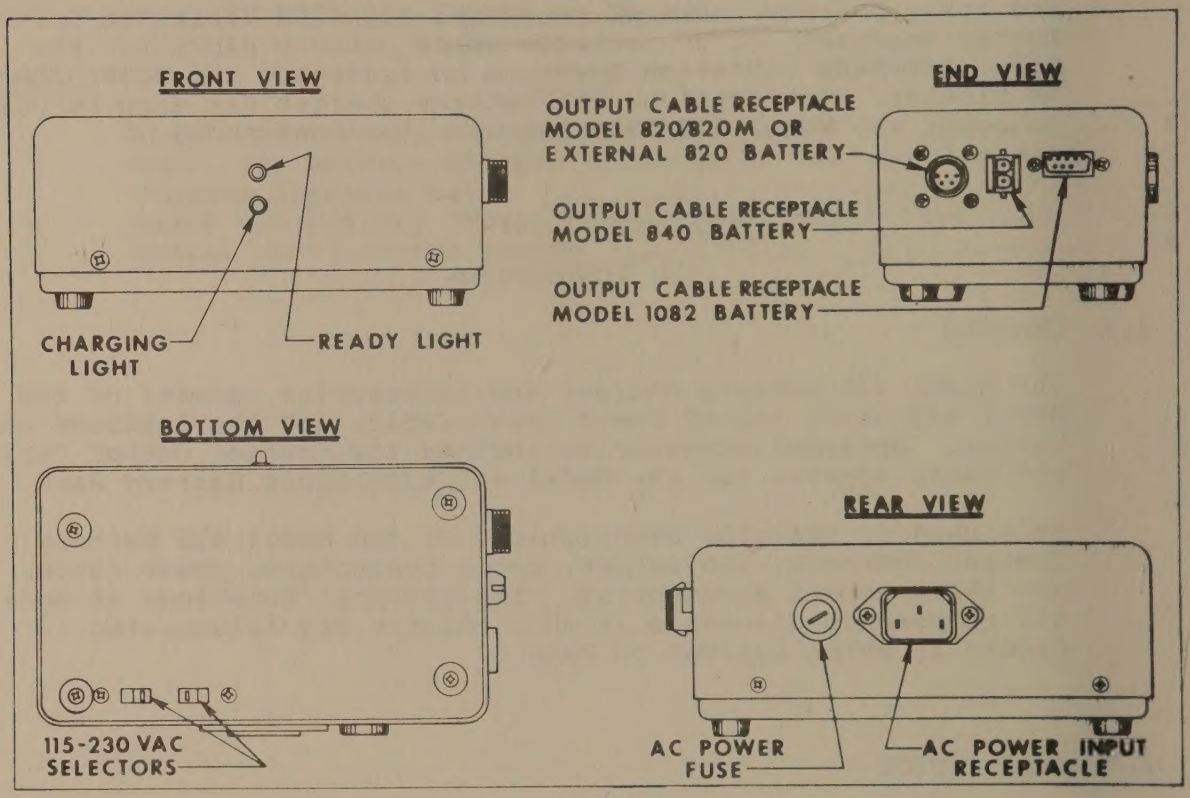


Figure 1 Controls, Indicators, Cable Receptacles, and Power Fuse Locations

2.2.2 CABLE CONNECTORS

AC Power Input Receptacle

The AC Power Input Receptacle receives the three-wire connector of the AC Power Cable. The male end of this cable connects to the AC Power Line. The AC input voltage may be 90 to 126 or 190 to 252 volts, single phase AC, at 48 to 440 Hz.

DC Output Receptacles

A. For Model 820/820M Instrument/Spare Battery Pack - A threaded receptacle is provided for connecting the 425 unit to the 820/820M Charger Output Cable (Part No. 24401). This cable is connected to the CHARGER INPUT receptacle on the 820/820M instrument, or to the threaded connector on the spare battery pack Cable Adapter (Part No. 24458). When the Charger Output Cable is connected to the 820/820M instrument, the 425 unit will power the instrument for continuous AC operation. A spare battery pack for the 820/820M Analyzer can be recharged only by using the Cable Adapter in conjunction with the battery pack.

B. For Model 840/840M Vibration Analyzer - A snap-in receptacle is provided for connecting the 840/840M battery pack cable connector to the 425 unit. The battery pack must be removed from the 840 instrument if it is to be connected to the Battery Charger.

C. For Model 1082 XY Plotter - A plug-in receptacle is provided for connecting the 1082 battery pack cable connector to the 425 unit. The battery pack must be removed from the 1082 instrument if it is to be connected to the Battery Charger.

2.2.3 AC POWER FUSE

The AC Power Fuse (Fig. 1) protects the Battery Charger circuit components from the AC power input, and from possible circuit overload. If this unit is connected to a 90 to 126 volt AC supply, a 1/2 ampere, 3AG Slo Blo fuse (Part No. 1511) is required. If the Battery Charger is connected to a 190 to 252 volt AC supply, a 1/4 ampere, 3AG Slo Blo fuse (Part No. 5276) is required. The power fuse is accessible from the rear side of the unit.

2.2.4 AC POWER INPUT SELECTORS

The AC Power Input Selectors (see Figure 1) consist of two slide-switches, and are accessible from the underside of the Battery Charger. Four ranges of AC input voltage may be connected to this unit (90 to 105 volts, 104 to 126 volts, 190 to 230 volts, or 208 to 252 volts). The configurations for setting the slide switches for the appropriate voltage range are shown on the instrument housing adjacent to the switches.

CAUTION: Make certain that the voltage selector slide switches are correctly set up for the AC input voltage to be used, and that the correct AC POWER FUSE is used. For an AC input voltage of 90 to 126 volts, or 104 to 126 volts, a 1/2 ampere fuse is required (Part No. 1511); and for an AC input voltage of 190 to 230 volts, or 208 to 252 volts, a 1/4 ampere fuse is required (Part No. 5276).

2.3 SPECIFICATIONS

This section contains the specification for the Model 425 Battery Charger and the standard accessories. Table 1, which follows, lists the specifications for the Battery Charger.

TABLE 1 MODEL 425 BATTERY CHARGER SPECIFICATION

ITEM	SPECIFICATION
AC VOLTAGE INPUT RANGE	From 90 to 105 VAC; 104 to 126 VAC; 190 to 230 VAC; or 208 to 252 VAC.
AC POWER CONSUMPTION	34 watts, maximum, at 48 to 440 Hz.
AC POWER FREQUENCY	From 48 to 440 Hz, Single phase.
TEMPERATURE RANGE	Operating Temperature, 0 to 122° F (-18 to 50° C). Storage Temperature, -40 to 140° F (-40 to 60° C).
DIMENSIONS	Height, 3.0 inches (7.6 cm). Width, 4.0 inches (10.2 cm). Length, 7.0 inches (17.8 cm).
CONSTRUCTION	Painted Aluminum Case.
WEIGHT	3.75 pounds (1.36 kgm).
STANDARD ACCESSORIES	AC Power Input Cable: 8-foot (2.4 meters), Part No. 19643 Instruction Manual, Part No. 25155.
OPTIONAL ACCESSORIES	Charger Cable, for use with Model 820/820M Analyzer. Part No. 24401.
------	Adapter, for use with Model 820/820M Charger Cable and Spare Battery Pack, Part No. 24458. Fuse, 1/2-ampere, 3AG Slo-Blo, Part No. 1511 Fuse, 1/4-ampere, 3AG Slo-Blo, Part No. 5276.

III PREPARATION FOR OPERATION

3.1 GENERAL

The preparations required for operating the Battery Charger consist of installing the connector cables, setting up the input AC voltage selectors, installing the required AC power fuse, and connecting the power card to the required value of AC voltage supply. The locations of these components are shown in Figure 2.

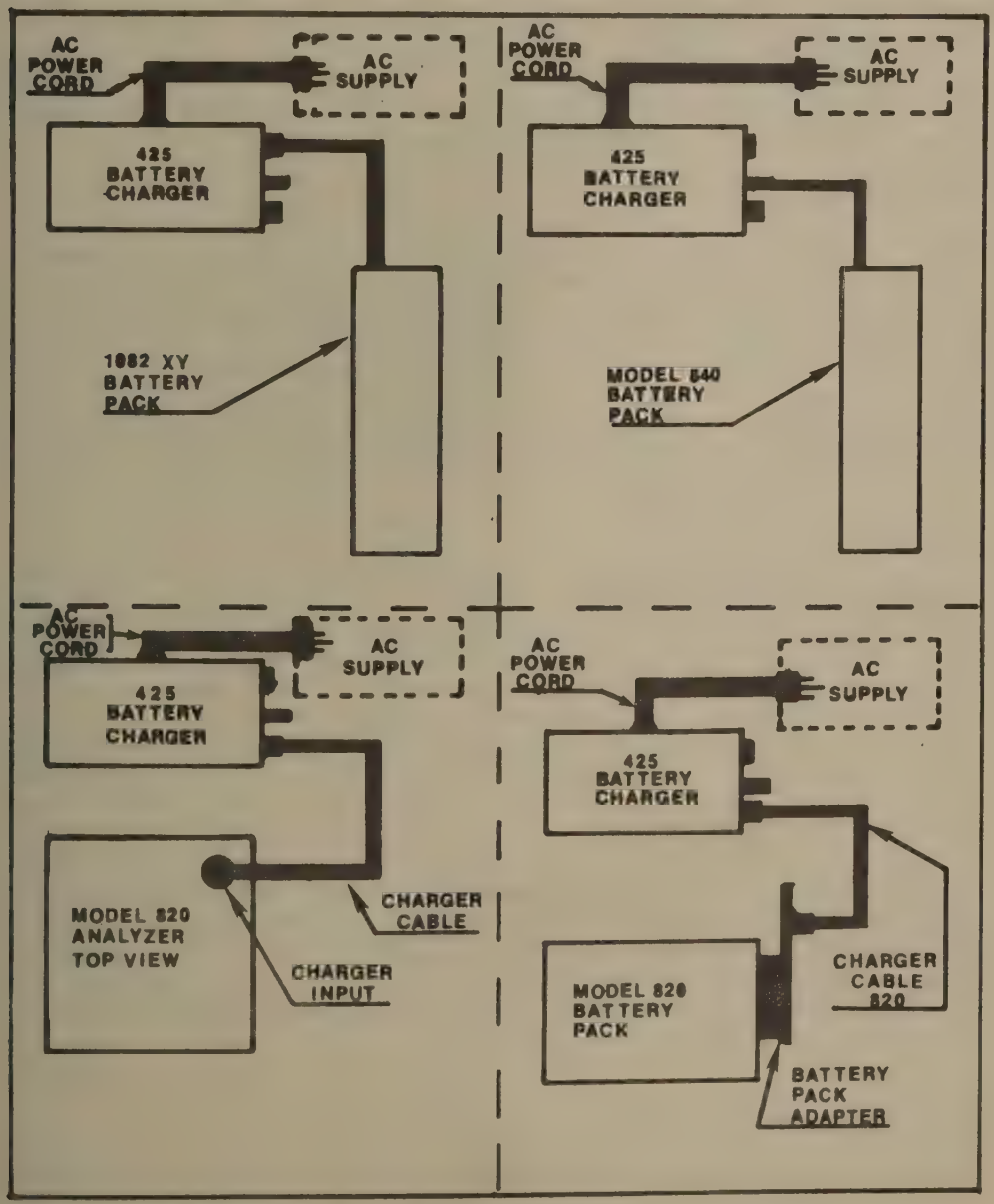


Figure 2 Model 425 Cabling Diagram

3.2 AC INPUT VOLTAGE SELECTION

The input voltage selectors must be set up for the AC supply voltage to be used before AC Power is connected to the instrument. The Battery Charger is designed for connection to 90 to 105 volts, 104 to 126 volts, 190 to 230 volts, or 208 to 252 volts AC, 48 to 440 Hz, single phase. The input Voltage Selectors consists of two slide switches located at the underside of the Battery Charger as shown in Figure 1. The configurations required for each range of AC input voltage are shown on the instrument housing.

CAUTION: Improper setting of the Input Voltage Selectors may adversely affect the Battery Charger performance and could result in damage to the instrument. Both slide switches must be set to the positions shown on the instrument housing for the AC input voltage to be used.

3.3 POWER FUSE SELECTION

The required power fuse amperage rating is determined by the value of the AC input voltage to be used. For connection to 90 to 126 volts AC, a 1/2-ampere, 3AG Slo-Blo fuse, Part No. 1511, is required; or for connection to 190 to 252 volts AC, a 1/4-ampere, 3AG Slo-Blo fuse, Part No. 5276, is required.

CAUTION: Make certain that the correct AC POWER FUSE is installed before connecting the Battery Charger POWER CORD to the AC line voltage.

3.4 CABLE CONNECTIONS

AC Power Cord Connection

The female plug-in connector at one end of the AC Power Cord connects to the AC INPUT receptacle on the rear side of the Battery Charger. See Figure 2. The male power line connector at the opposite end of the power cord connects to user's fused AC receptacle. International Standard, 3-wire connectors are used on the power cord, and are suitable for connection to either 115 or 230 volts AC.

For connection to a USA Standard, 2-pin AC power disconnect, adapter Part No. 1222 can be used, if permitted by the user's local electrical code and providing that the AC power disconnect box is grounded. The green wire on the adapter should be connected to the mounting screw on the disconnect box cover plate.

DC Output Cable Connection to Model 820/820M or Battery Pack

The DC Output Cable can be connected to the Model 820/820M to recharge the internal battery pack of this instrument, or to power the 820/820M continuously from the AC Power line. In addition, the cable can also be connected to a spare Battery Pack to recharge the batteries, or to keep them fully charged.

To connect to the 820/820M, connect the threaded female fitting at one end of the cable to the corresponding male fitting on the Battery Charger, see Figure 2. The connector at the other end of the cable connects to the threaded male CHARGER INPUT receptacle on the Model 820/820M Front Panel.

To connect the Battery Charger output to an external Battery Pack, connect the female fitting at one end of the Charger Output Cable to the threaded fitting on the Charger unit, See Figure 2. Connect the other end of the Charger Cable to the threaded fitting on the Cable Adapter, Part No. 24458. Then, plug in the adapter to the connector on the side of the Battery Pack.

DC Output Cable Connection to Model 840/840M Battery Pack

Remove the Battery Pack from the Model 840/840M housing. See the Model 840 Instruction Manual. Then, connect the snap-in male fitting on the Battery Pack Cable to the corresponding fitting on the side of the Battery Charger. See Figure 2.

DC Output Cable Connection to Model 1082 Battery Pack

Remove the Battery Pack from the Model 1082 XY Plotter housing. See the Model 1082 Instruction Manual. Then, insert the fitting of the Battery Pack cable to the corresponding male fitting on the side of the Battery Charger, see Figure 2.

IV OPERATION

4.1 GENERAL

Before operating the Model 425 Battery Charger, check that each requirement explained in Chapter III has been met. These requirements consist of setting up the input voltage selectors for the AC input voltage to be used, installing the proper power fuse for this voltage, connecting the AC Power Cord to the AC Supply Voltage, and connecting the DC Output Cable to the Model 820/820M Analyzer or spare Battery Pack.

CAUTION: Make certain that the Battery Charger input voltage selectors are correctly set up for the AC voltage used, and that the correct power fuse is installed.

4.2 OPERATION OF THE MODEL 425 UNIT

Connect the Battery Charger AC Power Cord to the required AC supply voltage disconnect to power the Battery Charger. When the Battery Charger is recharging the Battery Pack, or powering the Model 820/820M Analyzer, the amber CHARGING LIGHT will be lit. When the batteries are charged to 90 percent of their full capacity, the CHARGING LIGHT turns off, and the green READY light turns on. This operation indicates that the recharging process has been completed.

The Battery Charger provides a trickle charging current after the READY light is lit to maintain the Battery Pack fully charged. NOTE: If the AC Power is disconnected while the Battery Charger is connected to a battery pack, the READY light will be lit.

Approximately eight hours are required to recharge a depleted Battery Pack to 90 percent of its charge capacity. Protection from overcharging the batteries is provided by electronic controls inside the Model 425.

A charging interval greater than eight hours will be required if more than one battery pack is connected to the Battery Charger at the same time, or if the battery pack has been completely discharged.

4.3 OPERATION WITH MODEL 820/820M ANALYZER

If desired, the internal Battery Pack of the Model 820/820M can be recharged without removing it from the instrument. In addition, the Model 820/820M can be operated during recharging if the BATTERY TEST operation for this instrument indicates that the 820/820M meter reading is above the "LO" point on the meter scale.

If possible, the Model 820/820M Analyzer should be turned off during the recharging to reduce the amount of charging time required. A spare Battery Pack for the Model 820/820M can be recharged externally by using the Cable Adapter, Part No. 24458, along with the Charger Cable.

V SERVICE

5.1 GENERAL

This chapter contains complete service information for the Model 425 Battery Charger. Calibration instructions, a trouble-shooting guide, and a replacement parts list are provided to aid the service technician in repairing the Battery Charger circuits.

5.2 BASIC SERVICE

Basic Service checks which do not require the use of electronic test equipment can be performed by the user, if desired, to resolve minor problems.

If rechecking the set up procedure described in Chapter 3, Preparation for Operation, does not resolve the difficulty, additional checks should be performed as follows:

Observing the Charging and Ready Lights

NOTE: The AC Power Cord should be connected to the Power Line for the following checks.

If 1) the DC Output is connected to a depleted battery pack and the CHARGING light is not lit, or 2) the DC Outputs are disconnected and the READY light is not lit, the following items should be checked:

A. Check each cable for proper connection and seating in the cable receptacles. The threaded connectors should be hand tightened only. Check the cables for electrical breaks by flexing the cables at the connectors.

B. Check for a blown power fuse, see Figure 1, and replace only with the specified fuse type and amperge rating. A 1/2-ampere, 3AG Slo-Blo Fuse, Part No. 1511, is required with an AC input of 90 to 126 volts, and a 1/4 ampere, 3AG Slo-Blo Fuse, Part No. 5276, is required with an AC input of 190 to 252 volts.

CAUTION: Do not use a higher amperage fuse than specified, as this could result in serious damage to the Battery Charger. If the Power Fuse blows repeatedly, the unit should be serviced before using. A qualified electronics technician, using the proper servicing instruments, is required for trouble shooting and repairing the Battery Charger. If required, the Battery Charger can be shipped to an Authorized IRD Service Depot, or returned to IRD Mechanalysis for service; see addresses on Page 19.

5.3 CALIBRATION

Test Equipment Required

A. Multimeter, Fluke, Model 8050A, or equivalent.
B. Meter Test Leads.
C. AC voltage supply, 115 Volt, 45 to 440 Hz, single phase.
D. Power Resistor Decade Box

NOTE: The AC supply voltage should be connected to the Battery Charger (AC POWER INPUT receptacle), and the DC output cable should be disconnected.

Calibration Procedures

Two adjustable potentiometers are used to control the charging voltage values produced by the 12-volt and 6-volt sections of the Battery Charger circuitry. The calibration potentiometers should be set up in accordance with the instructions listed in Table 2, which follows. The DC Meter and Decade Box should be connected in parallel to the circuit points indicated.

TABLE 2 MODEL 425 BATTERY CHARGER CALIBRATION

CAL. STEP NO.	NAME OF ADJUSTMENT	COMPONENT DESIGNATION AND FIND LETTER (FIG. 3)	CIRCUIT CONNECTIONS REQUIRED	OUTPUT VOLTAGE REQUIRED
1	12-VOLT OUTPUT	REF. A R-109	DC METER, DECADE BOX; J104-3 (+) J104-1 (-) Also, set DECADE BOX to 66 ohms.	+13.7 VOLTS DC
2	6-VOLT OUTPUT	REF. B R-120	DC METER, DECADE BOX; J104-2 (+) J104-1 (-) Also, set DECADE BOX to 34 ohms.	+6.85 VOLTS DC

5.4 TROUBLE SHOOTING GUIDE

The physical layout of the Battery Charger components is shown in Figure 3A/3B, and the instrument circuit schematic is shown in Figure 4A/4B. Defective components can be isolated to a particular section of the instrument circuits by analyzing the circuitry pertinent to the malfunction, and can be pin-pointed to the discrete components by careful measurement of the various voltages and resistances.

A trouble shooting guide is provided in Table 3, which follows. When using this guide, the multimeter listed in Section 5.3 should be used for the various measurements.

TABLE 3 TROUBLE SHOOTING GUIDE

TEST CHECK NO.	CIRCUIT CONNECTION		NORMAL OUTPUT LEVEL	SUGGESTIONS
	(+)Lead	(-) Lead		
1	CR102 CATHODE	DC COMMON	+23 to +25 VDC	If filter capacitor C101 is open, the output voltage will be higher than listed, and excessive ripple will be seen.
2	VR101-2	VR101-3	+2.50 VDC	If the voltage is higher or lower than listed, the 12 VDC output will be altered, and a defective VR101 would be indicated. Also, if this voltage is correct but the 12 VDC output is low, a defective 1C104 or VR103 would be indicated.
3	VR105-2	VR105-3	+2.50 VDC	If the voltage is higher or lower than listed, the 6 VDC output will be altered, and a defective VR105 would be indicated. Also, if this voltage is correct but the 6 VDC output is low, a defective 1C107 or VR106 would be indicated.
4	VR101-3 Also, Jumper J104-3 and J104-5	IC104-3	+0.45 VDC	A higher voltage (1.35 VDC) indicates a faulty IC102. If IC102 is open, the peak charging current decreases and the charging time will increase.

NOTE: If the CHARGING and READY LED LIGHTS are both extinguished or lit simultaneously, and the output voltages are correct, then IC208 (see Figure 3A/3B) is likely defective.

5.5 REPLACEMENT PARTS LIST

Table 4, which follows, lists the replacement parts for the Model 425 Battery Charger and the major accessories. The reference numbers listed in the table are keyed to the component reference numbers used in Figures 3A/3B and 4A/4B of the manual.

Certain components in the 425 circuits have been changed, starting with units having Serial Number Prefix "B". In Table 4 below, these components are designated by "Prefix B". Components which are not used in units having this Prefix letter are designated "Prefix A".

TABLE 4 MODEL 425 BATTERY CHARGER REPLACEMENT PARTS LIST

REFERENCE NUMBER	DESCRIPTION	PART NO.
C101-PREFIX A	Capacitor, 1500 UF, 50 VDC, 20% ELECTLYT.	20274
C101-PREFIX B C110-PREFIX B	Capacitor, 2200 UF, 35 VDC, 20% ELECTRLYT.	26154
C102, 103, 106, 107, 109, 111, C110-PREFIX A C112-PREFIX B	Capacitor, 0.1 UF, 50 VDC 20%, Ceramic	17143
C104, 108	Capacitor, 1.0 UF, 50 VDC, 10%, Ceramic.	20930
CR101	Diode, Silicon, FW200, Full Wave Bridge.	3565
CR102 thru CR109	Diode, Silicon, IN4003, 200 V.	5948

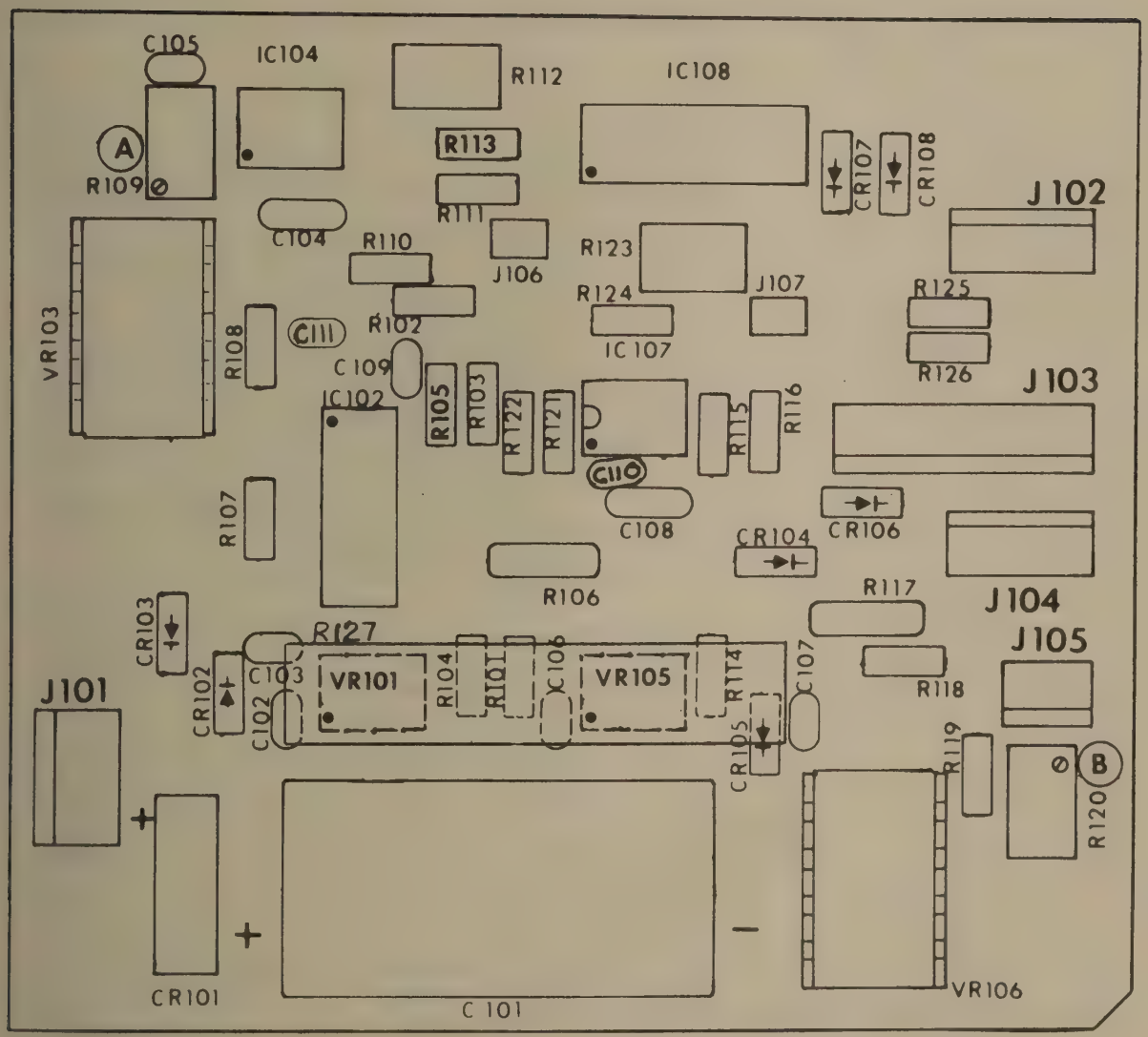


Figure 3A Component Locations on Internal PC Board for Units with Serial Number Prefix "A"

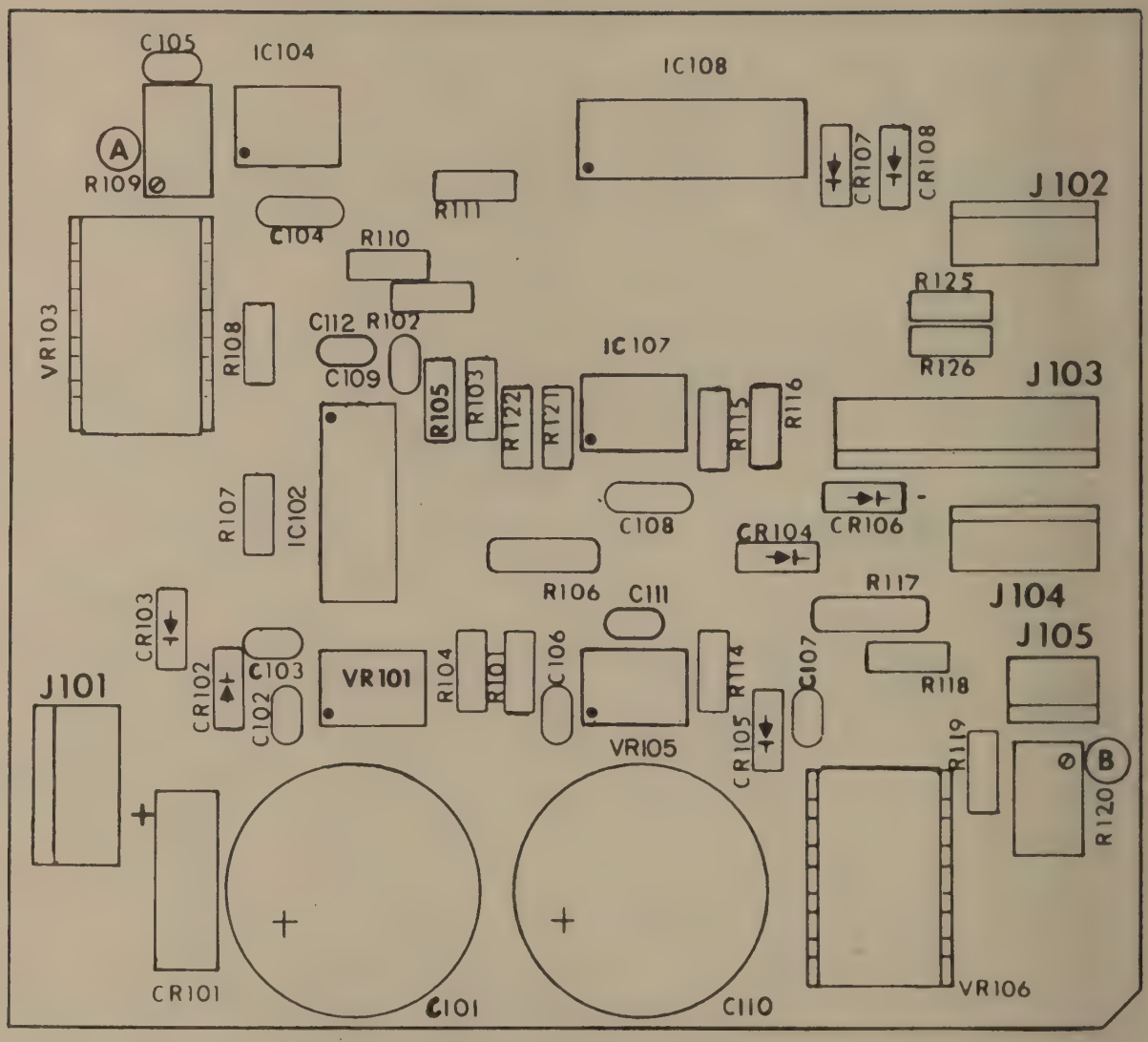


Figure 3B Component Locations on Internal PC Board for Units with Serial Number Prefix "B"

TABLE 4 CONTINUED

REFERENCE NUMBER	DESCRIPTION	PART NO.
-----	Fuse, AC Power, 1/2-ampere, 3AG Slo-blo, for 90 to 126 VAC operation.	1511
-----	Fuse, AC Power, 1/4-ampere, 3AG Slo blo, for 190 to 252 VAC operation.	5276
-----	Light Emitting Diode, Green	13774
-----	Light Emitting Diode, Amber	24409
IC102	IC, CMOS Switch, No. MC14066BCP.	19497
IC104,107	IC, Comparator, No. CA3290AE	23669
IC108	IC, Inverter, No. MC14049P	19496
J101	Header, 4-Pin	20219
J102, 104	Header, 5-pin.	20911
J103	Header, 9-pin.	24395
J105	Header, 3-pin.	20910
	Receptacle, AC Power Input, 3-pin	19645
	Receptacle, 2-pin, snap-in.	22317
	Receptacle, 9-pin, plug-in	22608
	Receptacle, 5-pin, threaded.	24204
R101	Resistor, 249K, 1/8W, 1%	16339
R102, 115	Resistor, 48.7K, 1/8W, 1%	10050
R103, 116	Resistor, 5.36K, 1/8W, 1%	10049
R104	Resistor, 56.2K, 1/8W, 1%	13570
R105, 111, and 122	Resistor, 100K, 1/8W, 1%	7868
R106, 117	Resistor, 1.5 Ohm, 1-1/2W, 5%	7879
R107, 118	Resistor, 249 Ohm, 1/8W, 1%	12103

TABLE 4 CONTINUED

REFERENCE NUMBER	DESCRIPTION	PART NO.
R108	Resistor, 2.43K, 1/8W, 1%	14093
R109, 120	Potentiometer, 1K, 1/2W, 25 Turn, 10%	14037
R110, 121	Resistor, 100 Ohm, 1/8W, 1%	7843
R119, 126	Resistor, 750 Ohm, 1/8W, 1%	7847
R125	Resistor, 732 Ohm, 1/8W, 1%	13554
R127-PREFIX A	Resistor, 12 ohm, 12W	26126
----	Slide Switch, Dual DPDT	21521
PREFIX A	Transformer, AC Power, 115/230 Volt.	24088
PREFIX B	Transformer, AC Power, 115/230 Volt.	26175
VR101, 105	Semiconductor, Voltage Reference, MC1403U	17407
VR103, 106	Semiconductor, Voltage Regulator, LM317T	19325
----	AC Power Cord, 3-wire, 8-foot (2.4 meters)	19643
----	Adapter, Charger Cable to Battery Pack	24458

5.6 ORDERING REPLACEMENT PARTS

To order replacement parts, contact either your local IRD Service Depot, or write to the IRD Mechanalysis Home Office, see the address in Section 5.9. On your Purchase Order, the following information should be specified:

1. The complete Model and Serial Numbers of the instrument.

2. The IRD Mechanalysis Part Number.

3. The name of the part, for example, resistor, capacitor, diode, transistor, etc.

4. The component reference symbol as shown on the PC Board and Electrical Schematic, for example, C101, R101, etc.

To order a part not listed in this manual, provide a complete description of the part along with its function and location.

5.7 OBTAINING SERVICE

Before returning the Battery Charger for repair, obtain service and shipping instructions from either your local IRD Service Depot or the IRD Mechanalysis Home Office, see the addresses in Section 5.9. The instrument should be packaged in a strong carton along with the accessories (interconnection cables, etc.). Each article must be well padded.

In addition, make certain that information is also included to explain the nature of the problem, and the type or extent of the service desired.

5.8 MANUAL MODIFICATION RECORD

Table 5, which follows, contains a summary of the Battery Charger and instruction changes included in this manual. The higher Change Letter shown in the table is also listed on the face page of this manual.

TABLE 5 MANUAL MODIFICATION RECORD

CHANGE LETTER	SUMMARY OF CHANGE	CHANGE DATE	ECO REF. NUMBER
A	Replaced 1C108 pins 14,15 with pins 9,10,11,12 on Page 20.	Aug. 81	4461
	Changed R102, R115 to 43.2K, Part No. 9716 on Page 20.		4609
	Changed R103, R116 to 12.1K, Part No. 10070 on Page 20.		"
	Added C110, C111 and R127 to Table 4 and on Pages 13 and 20.		"
	Removed J106, J107 on Page 20.		"
	Fast/Float voltages changed as noted on Page 20		"
	Miscellaneous corrections made on Pages 2, 4, 8, 9, 10, 11, 12, 13, 15, 18 and 19 as follows:		NONE
	Page 2: revised description of READY LIGHT operation.		
	Page 4: revised specifications for Power Consumption and Temperature Range.		
	Page 8,9: Changed OPERATION AND SERVICE writeup to accommodate design changes.		
	Page 10: Added DECADE BOX to Parts List, changed calibration procedure and voltage values to accommodate design changes.		
	Page 11: Revised Trouble Shooting Guide.		
	Page 12: Revised Table 4.		
	Page 13: Added C110, C111, R127 to Figure 3A. Changed callout B.		
	Page 18: Updated listing of manual changes.		
	Page 19: Updated Service Department addresses.		
	Changes effective Serial Number Prefix "B".		4872

5.9 CUSTOMER SERVICE AGENCIES

USA

IRD MECHANALYSIS, INC.
6150 Huntley Road
Columbus, Ohio 43229
Phone: 614/885-5376
Telex: 24:5318

IRD MECHANALYSIS, INC.
8826 Interchange Drive
Houston, Texas 77054
Phone: 713/667-0941

IRD MECHANALYSIS, INC.
3130 Maple Drive, N.E.
Suite 114
Atlanta, Georgia 30305
Phone: 404/237-4875

IRD MECHANALYSIS, INC.
Suite A2
221 South Chester Pike
Glenolden, Pennsylvania 19036
Phone: 215/461-7060

IRD MECHANALYSIS, INC.
Suite 4
3377 Mt. Diablo Boulevard
Lafayette (San Francisco)
California 94549
Phone: 415/283-2065

IRD MECHANALYSIS, INC.
1131 Warren Avenue
Downers Grove, Illinois 60515
Phone: 312/960-4065

CANADA

IRD MECHANALYSIS LIMITED
333 Barton Street East
Stoney Creek, (Hamilton)
Ontario, Canada L8E 2L1
Phone: 416/662-7577
Telex: 061-8453

IRD MECHANALYSIS LIMITED
Room 203
524 17 Avenue, S.W.
Calgary, Alberta
Canada T2S 0B2
Phone: 403/264-4130
Telex: 03-824680

UNITED KINGDOM

IRD MECHANALYSIS (UK) LIMITED
Bumpers Lane
Sealand Industrial Estate
Chester, United Kingdom CH1 4LT
Phone: Chester 44/244/374914-5
Chester 44/244/317557-8
Telex: 851-617034 IRD MECH G

WESTERN EUROPE

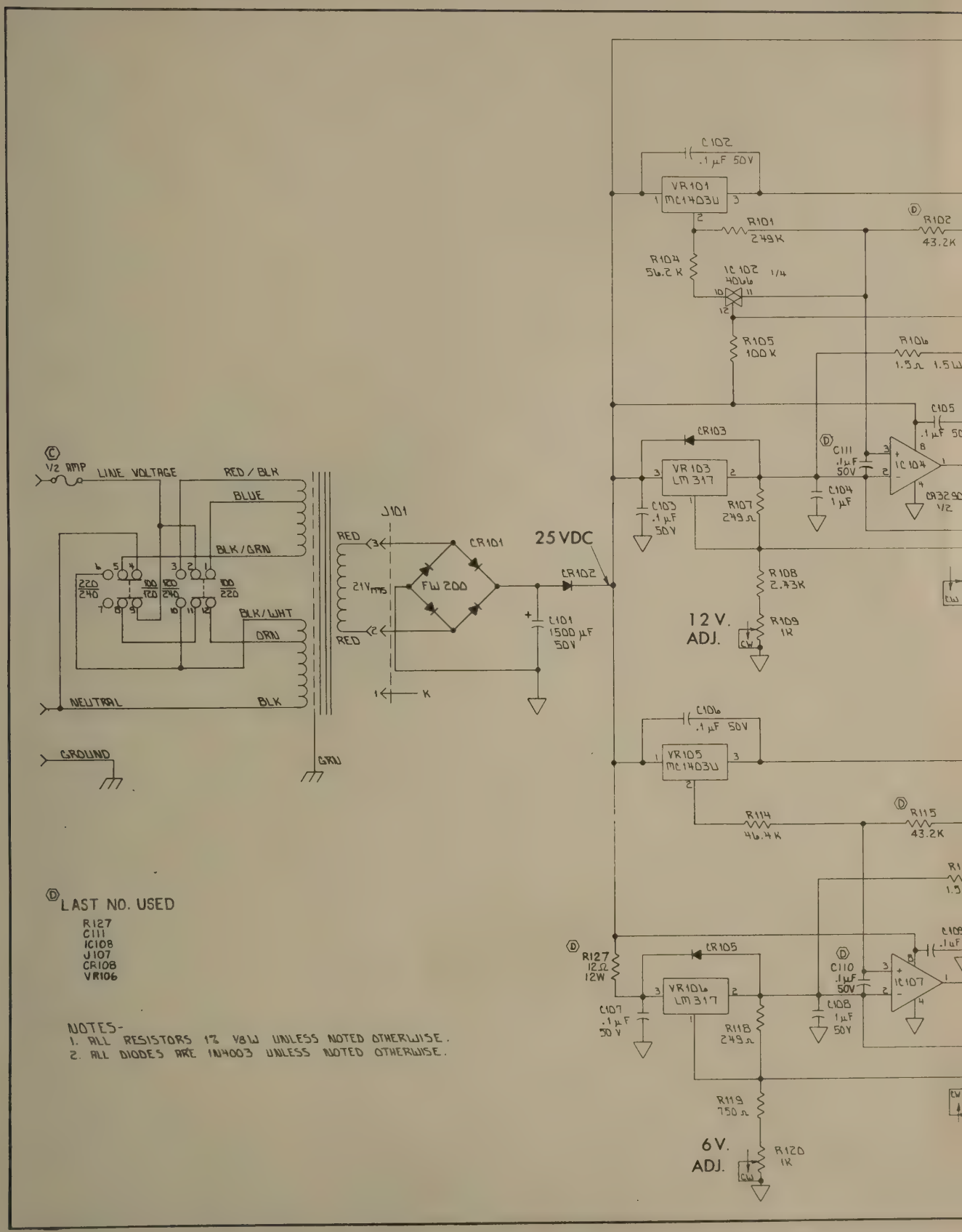
IRD MECHANALYSIS, S.A.
Avenue Winston Churchill 98
B1180 Brussels, Belgium
Phone: 32/2/344.70.58
32/2/344.72.18
Telex: 846-61256 IRD BRU B

AUSTRALIA

IRD MECHANALYSIS (AUSTRALIA)
PTY. LTD.
337 Pacific Highway
Crows Nest, NSW 2065
Australia
Phone: (02) 929 8122
Telex: AA 23193

INDIA

IRD MECHANALYSIS (INDIA) LTD.
47/48 Jolly Maker Chambers II
Nariman Point
Post Office Box 991
Bombay 400 021, India
Phone: 230430
Telex: 953-11-3209 CIPL IN

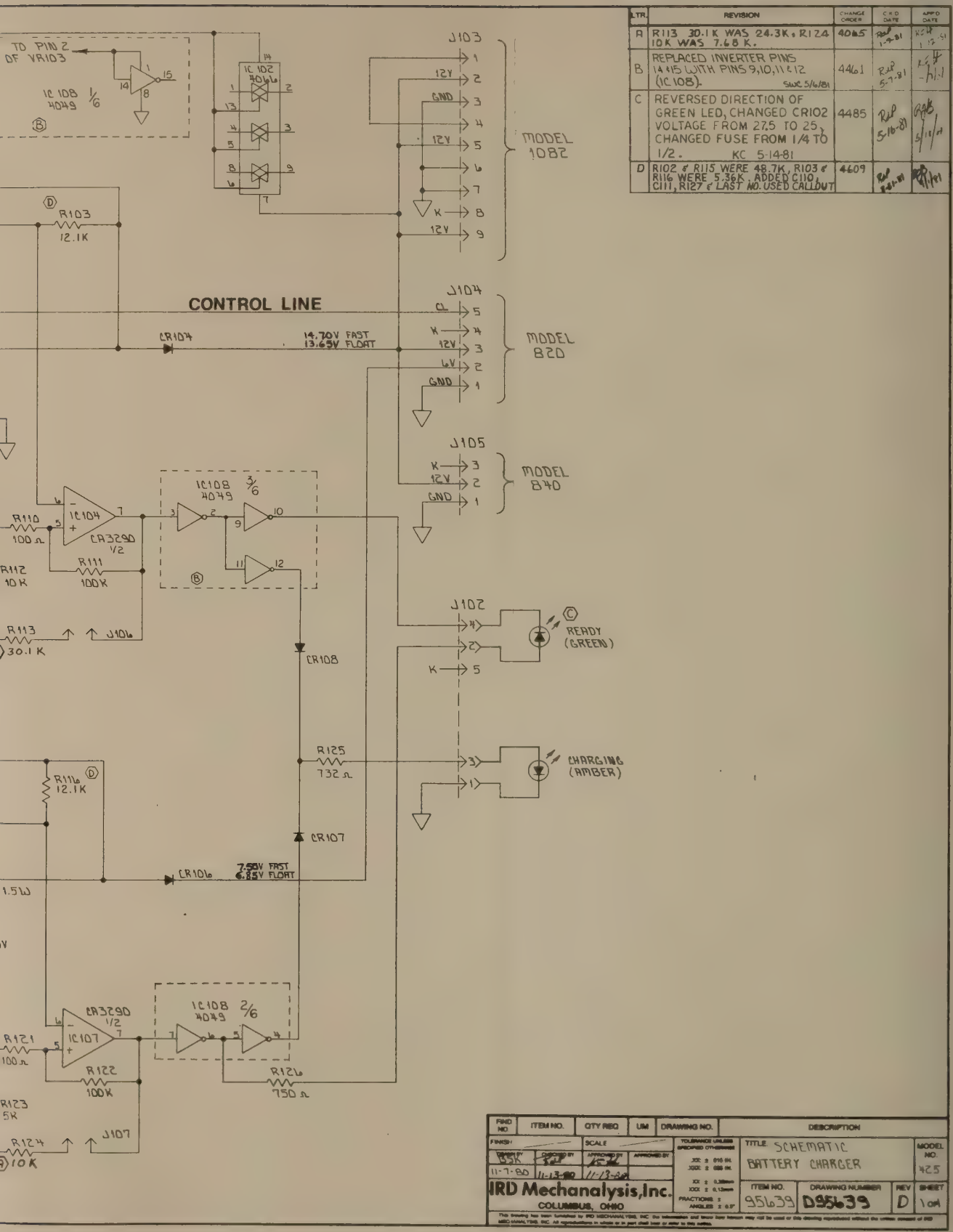


Ⓓ LAST NO. USED

R127
C111
IC108
J107
CR108
VR106

NOTES-
1. ALL RESISTORS 1% V8W UNLESS NOTED OTHERWISE.
2. ALL DIODES ARE 1N4003 UNLESS NOTED OTHERWISE.

Figure 4A Electrical Schematic of Battery Charger Circuits -Serial Number Prefix "A"



LTR.	REVISION	CHANGE ORDER	CKD DATE	APPD DATE
A	R113 30.1K WAS 24.3K, R124 10K WAS 7.68K.	4065	Rwb 1-7-81	KCH 1-12-81
B	REPLACED INVERTER PINS 14 & 15 WITH PINS 9,10,11 & 12 (IC 108). SWC 5/6/81	4461	RWB 5-7-81	KCH 5/11/81
C	REVERSED DIRECTION OF GREEN LED, CHANGED CR102 VOLTAGE FROM 27.5 TO 25, CHANGED FUSE FROM 1/4 TO 1/2. KC 5-14-81	4485	RWB 5-18-81	RWB 5/18/81
D	R102 & R115 WERE 48.7K, R103 & R116 WERE 5.36K. ADDED C110, C111, R127 & LAST NO. USED CALLOUT	4609	RWB 9-21-81	RWB 9/21/81

FIND NO.	ITEM NO.	QTY REQ	U/M	DRAWING NO.	DESCRIPTION

FINISH: SCALE

DRAWN BY: DJK 11-7-80 | CHECKED BY: RWB 11-13-80 | APPROVED BY: KCH 11-13-80

TOLERANCE UNLESS SPECIFIED OTHERWISE: XX ± .010 IN., XXX ± .005 IN., XX ± 0.25mm, XXX ± 0.12mm, FRACTIONS ±, ANGLES ± 0.5°

TITLE: SCHEMATIC BATTERY CHARGER

MODEL NO.: 425

ITEM NO.: 95639 | DRAWING NUMBER: D95639 | REV: D | SHEET: 1 OF 1

IRD Mechanalysis, Inc. COLUMBUS, OHIO

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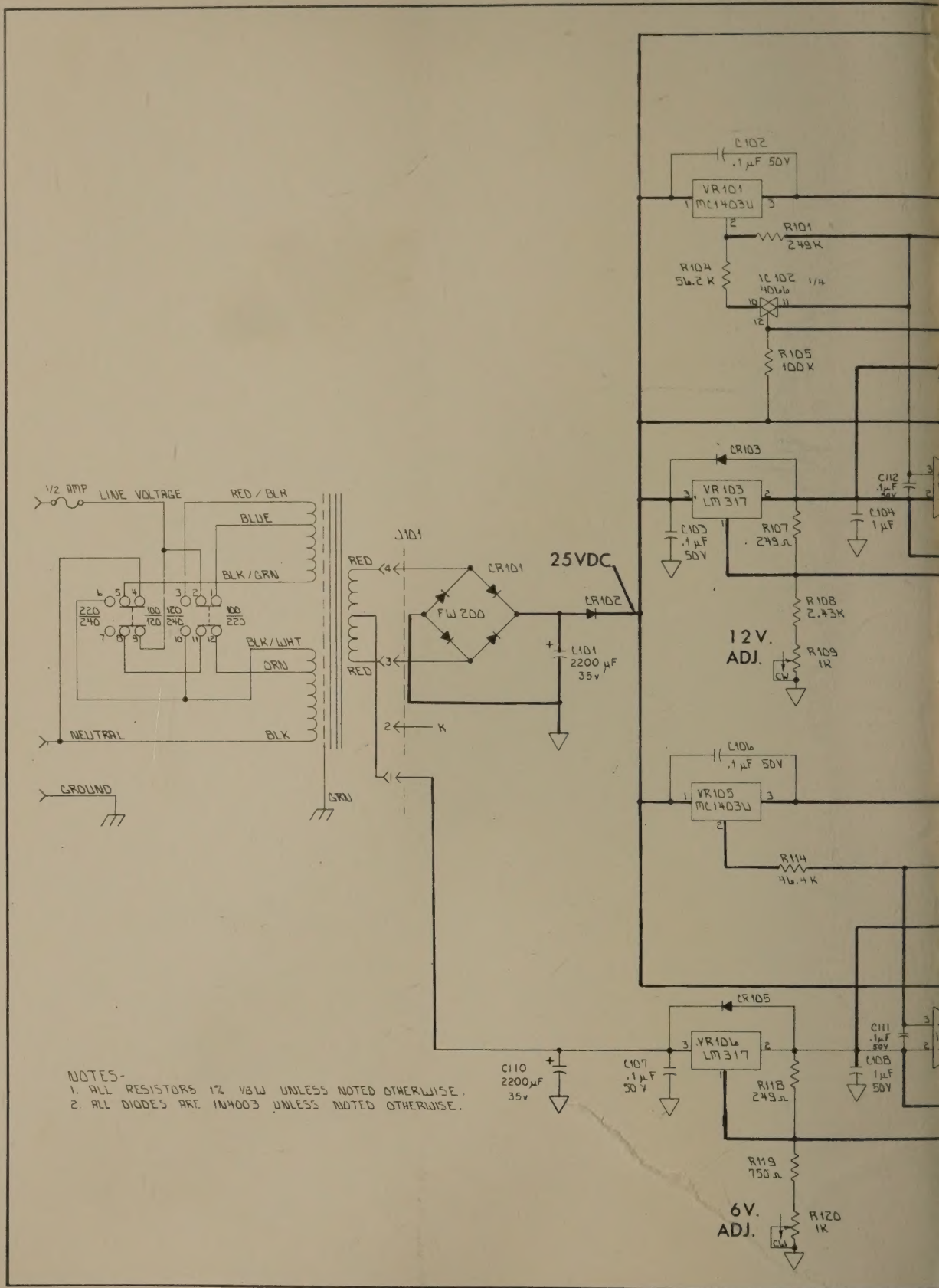

NOTES-
1. ALL RESISTORS 1% 1/8W UNLESS NOTED OTHERWISE.
2. ALL DIODES ARE 1N4003 UNLESS NOTED OTHERWISE.

Figure 4B Electrical Schematic of Battery Charger Circuits
-Serial Number Prefix "B"